

STEFAN MIELEWCZYK

**Ważki (*Odonata*) rzeki Raby, niektórych jej dopływów  
i zbiorników przyrzecznych \*****The dragonflies (*Odonata*) of the River Raba, of some of its  
tributaries, and of riverine water bodies**

Mémoire présenté le 8 janvier 1937 dans la séance de la Commission Biologique  
de l'Académie Polonaise des Sciences,  
Cracovie

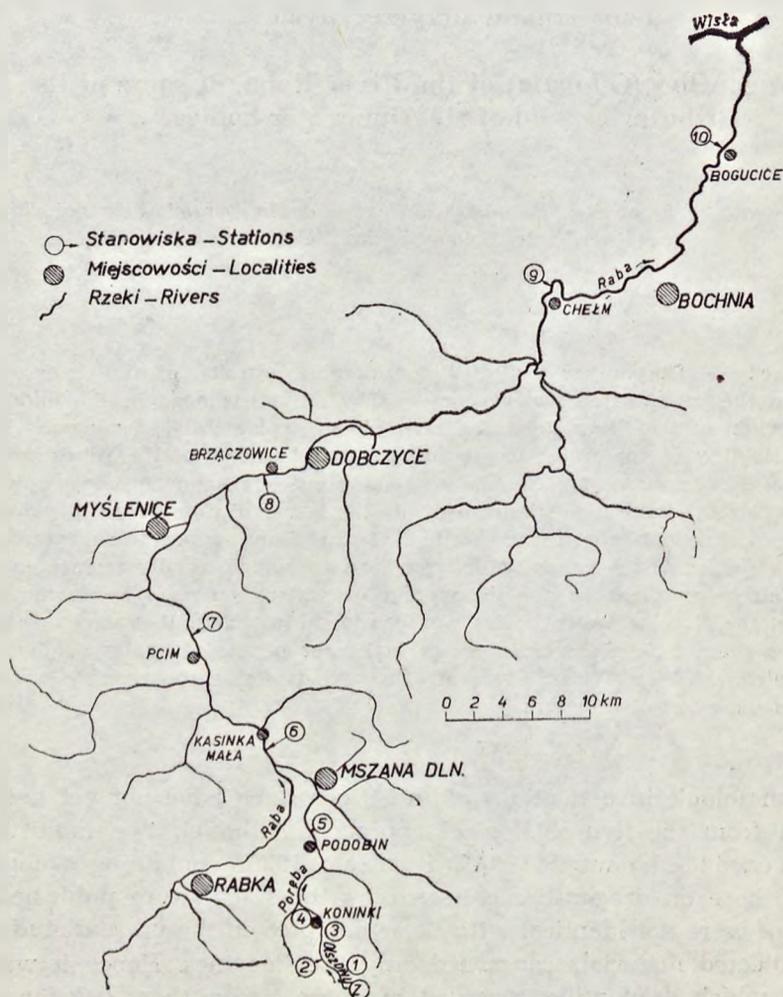
**Abstract** — The author indicates considerable scarcity of the fauna of dragonflies in the investigated water courses: they only developed in the middle and lower section of the River Raba. He attempts to explain this phenomenon by the great variability of the water levels and by the character of the substratum. Generally, *Calopteryx virgo* (L.), *Gomphus vulgatissimus* (L.), and *Onychogomphus forcipatus* (L.) occurred as single specimens. Only the larvae of *Calopteryx splendens* (Harr.) which lived in the lower section of the Raba appeared in greater numbers. The species of the genus *Calopteryx* Leach, which usually replace each other, are fairly important in the description of water courses. The fauna of dragonflies in the riverine water bodies was considerably richer. It was composed of the species characteristic for small water bodies or of those usually dominant in weakly eutroficated reservoirs. For some rheophilous forms the riverine water bodies proved some sort of refugium.

The odonatologic investigations of the River Raba have not yet been carried out from the hydrobiological approach. Although two faunistic works (Zacwilichowski 1932, Rymar 1936) containing among other data those on dragonflies collected by the Raba, were published, their stations were not identical with those accepted in the present study, and the collected materials concerned only the imagines. Hence it was not certain which dragonflies recorded by these two authors developed

\* Praca wykonana w ramach problemu resortowego PAN nr 21.

in the Raba and which in the riverine water bodies. The representation of the real population of these insects in the waters may only be obtained by collecting their larvae or by the simultaneous catching of larvae and imagines.

In the years 1970—1971 field observations were carried out by the author in the spring-summer season at 10 selected stations of the water course, beginning from the springs of the Olszowy Stream up to the section of the River Raba near the mouth in Bogucice (fig. 1), as well as in the riverine water bodies in the regions of the selected stations. A total number of 407 larvae and 177 imagines of 26 species (Table I) were collected, i.e. 36.6 per cent of the species known in the territory



Ryc. 1. Dorzecze Raby (Z — źródło)  
Fig. 1. Catchment basin of the River Raba (Z — spring)

Tabela I. Wazki (Odonata) Raby i zbiornikow przyrzecznych. i - imaga; l - larwy

Table I. The dragonflies (Odonata) of the River Raba and of the riverine water bodies. i - imagines; l - larvae

| Gatunek<br>Species                     | Stanowisko = Station   |   |                   |   |   |                      |                         |  |   |                    |
|--|--|---|-------------------|---|---|----------------------|-------------------------|--|---|--------------------|
|  | 3a   | 3b  | 4a                | 6a  | 7a  | 8                    | 9                       | 9a   | 9b  | 10                 |
|  | Droga i drobne źródła nad Potokiem Olszowym<br>The road and small springs above the Olszowy Stream | Limnokrę nad Potokiem Olszowym<br>Limnokrę above the Olszowy Stream | Kopinki: Limnokrę | Kasinka Mała: zbiornik zalewowy<br>Kasinka Mała: the flood water body | Pocin: starorzecze Raby<br>Pocin: old river bed of the Raba | Braćzowice: the Raba | Raba<br>Cheżm: the Raba | Cheżm: zbiorniki przyrzeczne<br>Cheżm: riverine water bodies | Cheżm: starorzecze Raby<br>Cheżm: old river bed of the Raba | Bogucice: the Raba |
|  | 1  | 1   | 1                 | 1   | 1   | 1                    | 1                       | 1  | 1   | 1                  |
| <i>Calopteryx virgo</i> (L.)           |  |   |                   | 6   |   | 4                    |                         | 2  |   | 51                 |
| - <i>splendens</i> (Harr.)             |  |   |                   |   |   |                      |                         | 2  |   |                    |
| <i>Sympetma fusca</i> (Vander Lind.)   | 1  |   |                   |   |   |                      |                         |  |   |                    |
| <i>Lestes virans</i> (Charp.)          |  |   |                   |   |   |                      |                         | 1  | 1   |                    |
| - <i>dryas</i> Kirby                   |  |   |                   |   |   |                      |                         |  |   | 3                  |
| - <i>sponsa</i> (Hans.)                |  |   |                   |   |   |                      |                         |  |   | 2                  |
| <i>Platyonemis pennipes</i> (Pall.)    |  |   |                   |   | 88  | 28                   | 14                      | 2  |   |                    |
| <i>Ischnura elegans</i> (Vander Lind.) |  |   |                   |   | 36  | 20                   |                         | 2  |   | 1                  |
| - <i>pumilio</i> (Charp.)              |  |   |                   |   | 4   | 20                   |                         | 1  | 4   |                    |
| <i>Enallagma cyathigerum</i> (Charp.)  |  |   |                   |   | 6   | 2                    |                         | 9  | 3   |                    |
| <i>Agrion puella</i> (L.)              |  |   |                   |   | 37  | 36                   |                         | 46   | 7   | 5                  |
| - <i>pulchellum</i> (Vander Lind.)     |  |   |                   |   |   |                      |                         | 10   |   | 4                  |
| - <i>hastulatum</i> Charp.             |  |   |                   |   |   |                      |                         |  |   | 4                  |
| <i>Erythromma najas</i> (Hans.)        |  |   |                   |   | 1   |                      |                         | 2  |   |                    |
| <i>Aeschna grandis</i> (L.)            |  |   |                   |   |   |                      |                         | 10   |   | 2                  |
| - <i>cyanea</i> (Müll.)                |  | 5   | 25                |   | 9   |                      |                         | 1  | 5   |                    |
| - <i>mixta</i> (Latr.)                 | 1  |   |                   |   |   |                      |                         |  |   |                    |
| <i>Anax imperator</i> Leach            |  |   |                   |   |   |                      |                         | 1  |   |                    |
| <i>Comphus vulgatissimus</i> (L.)      |  |   |                   | 1   | 1   |                      | 1                       | 1  |   | 6                  |
| <i>Onychogomphus forcipatus</i> (L.)   |  |   |                   |   | 1   |                      | 1                       |  |   |                    |
| <i>Cordulegaster bidentatus</i> Sel.   | 2  |   |                   |   |   |                      |                         |  |   |                    |
| <i>Libellula depressa</i> L.           |  |   |                   |   | 4   |                      |                         | 12   | 1   |                    |
| <i>Orthetrum brunneum</i> Fonsc.       |  |   |                   |   |   |                      |                         |  |   |                    |
| <i>Sympetrum danae</i> (Sulz.)         |  |   |                   |   |   |                      |                         |  |   |                    |
| - <i>sanguineum</i> (Müll.)            |  |   |                   |   |   |                      |                         |  | 1   |                    |
| - <i>vulgatum</i> (L.)                 | 4  |   |                   |   |   |                      |                         |  | 2   |                    |
| <i>Sympetrum</i> sp.                   |  |   |                   |   | 1   |                      |                         |  |   |                    |

of Poland. Though the author did not carry out catches using the qualitative methods, nevertheless, due to careful searching and collecting of all larvae caught the quantitative relations among individual species are well preserved. The obtained materials are somewhat poor, yet they indicate some interesting phenomena and regularities.

### Description of the fauna of dragonflies of flowing waters

The fauna of dragonflies of the investigated water course (the Olszowy Stream, Koninka, Poręba, Mszanka, Raba) is unusually poor in its quantitative and qualitative composition. No larvae of any dragonflies were found at the stations 1—5 in the Olszowy Stream, at Koninka, and Poręba. It was only as far as in the marginal water body of the Raba at Kasinka Mała (station 6) that the author found a few larvae of *Calopteryx virgo* (L.), and one larva of *Gomphus vulgatissimus* (L.). The searches in the Raba at Pcim (station 7) were unsuccessful. At Brzączowice (station 8) the occurrence of a few larvae of *C. virgo*, one larva of *G. vulgatissimus*, and one specimen of newly metamorphosed *Onychogomphus forcipatus* (L.) was recorded. The imagines of *Platycnemis pennipes* (Pall.) were flying in fairly great numbers, their larvae developing at the bank abundantly overgrown by *Salix* sp. In the Raba at Chełm (station 9) only one larva of *G. vulgatissimus* was caught, while on the 14th May single imagines of this species were observed. Also single imagines of *C. virgo* occurred here, but it was not possible to find their larvae in the river. Near Bogucice (station 10), where the Raba flows rather slowly and its banks are covered with grasses and *Veronica beccabunga*, beside a few larvae of *G. vulgatissimus* the larvae of *Calopteryx splendens* (Harr.) develop in great numbers.

Of the species mentioned above the larvae of *C. virgo* and *C. splendens* are phytoreophilous forms (Mielewczyk 1966) living chiefly near overgrown steep and precipitous banks. Hence their rare occurrence in the Raba is justified, this river having flat and for the most part stony banks over a very great distance. A similar character is presented by the larvae of *Platycnemis pennipes*, which, besides flowing waters, chiefly populate the weakly eutrophicated lakes (Mielewczyk 1966, 1972). Instead, the larvae of *Gomphus vulgatissimus* and *Onychogomphus forcipatus* are bottom rheophilous forms occurring both in rivers and in the zones of breakers in larger lakes. They live mainly in sandy and gravelly bottoms of little motion. Their rare and not numerous occurrence in the River Raba may only be explained by the character of this river and of its substratum.

As Punzet indicates (1969), the Raba is characterized by considerable variability of water levels, the amplitude of their fluctuations amounting

to 3 m in the upper water course (Mszana Dolna), and even to over 9 m in the lower water course (Proszówki). These are examples of differences in many years extreme levels, but great variability of the waters of the Raba is also observed in any individual month, especially in the summer period (VII, VIII). The consequence of high water levels in an increase in the water flow and the phenomena connected with it: the erosion of the bottom and the transport of small insects, as well as of coarse gravel and even small stones. Such phenomena seem pernicious for inactive larvae of *G. vulgatissimus* and *Onychogomphus forcipatus*. These larvae burrow into the sand and erect their caudal pyramid over the surface of the bottom. They respire with gills which are found in the large intestine, therefore it seems that sucking up of turbid waters, often rich in dusty fractions, is not indifferent for them. On the Wielkopolsko-Kujawska Lowland in the zones of breakers of larger lakes both these species sometimes occur in relatively great numbers. The density of the larvae of *O. forcipatus* in a sandy and gravelly bottom free of dusty fractions amounts to even 10 specimens in one quadrate metre (Mielewczyk 1972).

The numbers of larvae of dragonflies in the Raba are too scanty and hence on this basis it is not possible to divide the river into characteristic sections. Yet it may be accepted that the sections with the larvae of *C. virgo*, which usually live in smaller and fast-flowing rivers and streams, belong to the middle course of the Raba, while the stations with the larvae of *C. splendens* which chiefly occur in larger rivers and slowly flowing streams, are fairly characteristic for the lower course of the River Raba.

### Descriptions of the fauna of dragonflies in the riverine water bodies

The water bodies accompanying the investigated water course (from the Olszowy Stream up to the River Raba at Chełm) are not of uniform character, hence the composition of the fauna of dragonflies is also differentiated.

The first dragonflies (imagines) were caught at the Olszowy Stream as far as below station 3. Here fairly numerous *Sympetrum vulgatum* (L.) and single *Sympecma fusca* (Vander Lind.) and *Aeschna mixta* (Latr.), which usually develop in swamps and in biotopes of the character of ponds, were flying over the road and a fir wood. At small springs several specimens of *Cordulegaster bidentatus* Sel., which is very characteristic for small montane streams, were observed. In the nearby limnokren strongly overgrown by aquatic and uliginose vegetation the occurrence of a few larvae of *Aeschna cyanea* (Müll.) was recorded.

In a similar limnokren at Koninki (station 4) also the larvae of only this species occurred, though their numbers were fairly significant. *Ae. cyanea* develops chiefly in small and generally shaded water bodies, being resistant to variation of the pH (Mielewicz 1966, 1969).

In the old river bed at Peim (station 7) where mainly *Sparganium ramosum*, *Scirpus silvaticus*, and *Myriophyllum spicatum*, and more rarely *Alisma plantago-aquatica*, *Typha latifolia*, *Veronica beccabunga*, *Juncus*, and *Carex* develop, the fauna of the dragonflies is already fairly rich. The occurrence of 13 species was observed and of this number only two were represented exclusively by the imagines. Among the larvae *Platycnemis pennipes* dominates, *Ischnura elegans* (Vander Lind.) and *Agrion puella* (L.) accompanying it in the greatest numbers. In the lowland the community *Platycnemis pennipes* and *Ischnura elegans* is above all characteristic for the weakly eutrophicated lakes (Mielewicz 1966, 1972), while numerous occurrence of *Agrion puella* is typical for small but permanent water bodies. From the species characteristic for this type of water body *Ischnura pumilio* (Charp.), *Aeschna cyanea* (Müll.), and *Libellula depressa* (L.) occur in smaller numbers. In the old river bed the larvae of species of the rheophilus type *Gomphus vulgatissimus* and *Onychogomphus forcipatus* also occur. A highly Mediterranean species *Orthetrum brunneum* Fonsc., two of whose imagines were caught by the author, is also connected with weakly flowing waters, while of the species typical for strongly eutrophicated water bodies only one larva of *Erythromma najas* (Hans.) was caught. Therefore the dragonflies collected here represent properly both the character and trophism of the discussed water body and its riverine situation.

Small water bodies at Chelm (station 9) periodically flooded by the water of the Raba, mainly have a silty bottom and fairly abundant vegetation: *Phragmites communis*, *Typha latifolia*, *Alisma plantago-aquatica*, *Butomus umbellatus*, *Glyceria fluitans*, *Potamogeton natans*, *Elodea canadensis*, *Myriophyllum*, etc. Here the fauna of the dragonflies is the most numerous of all the investigated water bodies. In this place the species *Agrion puella* typical for small water bodies dominates and of the accompanying species more numerous are: *Enallagma cyathigerum* (Charp.), *Agrion pulchellum* (Vander Lind.), and *Aeschna grandis* (L.), which normally occur in eutrophic water bodies. But the principal indicator species for strongly eutrophic waters, *Erythromma najas*, occurs here only in single specimens. From the species characteristic for small water bodies with loamy or silty bottoms *Ischnura pumilio*, *Anax imperator* Leach, and *Libellula depressa* develop here. The discussed riverine water bodies are flooded in the high water periods of the River Raba and considerable amounts of silt are there deposited. Hence they do not offer favourable conditions for the development of species

of the family *Gomphidae*, while single phytorheophilous larvae of *Calopteryx virgo* develop perfectly.

About 400 m away from the river in the old river bed of the Raba at Chelm (station 9) inundated only in flood periods, the processes of the eutrophication are far advanced. It has the character of a shallow pond with a very slimy bottom and is overgrown with *Potamogeton natans*, *Glyceria fluitans*, *Heleocharis* and *Carex* to a considerable degree. The materials collected from this water body reveal the most numerous occurrence of *Agrion puella*. However, the real character of this old river bed is reflected in the occurrence of *Lestes sponsa* (Hans.), *Agrion hastulatum* Charp., and *Sympetrum sanguineum* (Müll.), which usually develop in swamps and small water bodies in low bogs (Mielewicz 1966, 1970, 1972). In this old river bed the presence of the species of rheophilous type was not observed because of its character and of a considerable isolation from the waters of the Raba.

The investigations presented above indicate that the typical riverine water bodies are some sort of refugium for the larvae of certain species of dragonflies of rheophilous character, such as *Calopteryx virgo*, *Gomphus vulgatissimus*, and *Onychogomphus forcipatus*, as they make it possible for them to survive the periods of floods and prevent their transport far down the river. After the flood tide recedes, the possibilities occur for relatively fast regeneration of the rheophilous fauna of dragonflies in the river.

#### STRESZCZENIE

W wyniku badań prowadzonych w latach 1970—71 w Rabie, niektórych jej dopływach i zbiornikach przyrzecznych stwierdzono występowanie łącznie 26 gatunków ważek, co stanowi 36,6% gatunków znanych z obszaru Polski. Fauna ważek badanych wód bieżących jest nader uboga, co nie jest jednak zjawiskiem wtórnym, lecz wynikającym z naturalnego charakteru tych wód. Na wyżej położonych stanowiskach wyniki poszukiwań były negatywne. Obecność larw ważek stwierdzono jedynie w Rabie na stanowiskach 6—10. Z form reofilnych złowiono: *Calopteryx virgo* (L.), *C. splendens* (Harr.), *Gomphus vulgatissimus* (L.) i *Onychogomphus forcipatus* (L.). Występowały one na ogół pojedynczo. Liczne były jedynie larwy *Calopteryx splendens*, które zasiedlały tylko dolny odcinek Raby. Natomiast larwy *C. virgo* występowały wyłącznie na wyżej położonych stanowiskach (środkowy bieg Raby). Te dwa na ogół zastępujące się gatunki z rodzaju *Calopteryx* Leach mają dość duże znaczenie przy charakteryzowaniu wód bieżących. Fauna ważek w zbiornikach przyrzecznych jest znacznie bogatsza. Składają się na nią głównie gatunki charakterystyczne dla drobnych zbiorników, a także gatunki dominujące zwykle w zbiornikach słabo zeutrofizowanych. Dla niektórych form reofilnych zbiorniki przyrzeczne stanowią pewnego rodzaju refugium, umożliwiające im przetrwanie stanów powodziowych i zapobiegające dalekiemu ich przetransportowaniu w dół rzeki. Po ustąpieniu fali powodziowej może zatem nastąpić w rzece szybsza regeneracja reofilnej fauny ważek.

## REFERENCES

- Mielewczyk S., 1966. Larwy ważek (*Odonata*) Wielkopolskiego Parku Narodowego. Prace Monogr. Przyr. Wielkop. Parku Nar., 4, 1—39.
- Mielewczyk S. 1969. Larwy ważek (*Odonata*) niektórych torfowisk sfagnowych Polski. Pol. Pismo Ent., 39, 17—81.
- Mielewczyk S., 1970. Ważki (*Odonata*) i pluskwiaki wodne (*Heteroptera*) torfowiska niskiego pod Gnieznem (woj. poznańskie). Fragm. Faun., 16, 1—10.
- Mielewczyk S., 1972. Ważki (*Odonata*) okolic Gniezna. Fragm. Faun., 18, 141—162.
- Punzet J., 1969. Charakterystyka hydrologiczna rzeki Raby. Acta Hydrobiol., 11, 423—477.
- Rymar J., 1936. Przyczynki do fauny ważek (*Odonata*) Małopolski Zachodniej. Spraw. Kom. Fizjogr., 70, 129—132.
- Zaćwilichowski J., 1932. Ważki z okolic Rabki i Zarytego. Spraw. Kom. Fizjogr., 66, 75—76.

Adres autora — Author's address:

dr Stefan Mielewczyk

Polska Akademia Nauk, Instytut Zoologii, Oddział w Poznaniu, 60-809 Poznań,  
ul. Swierczewskiego 19